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Paper Power

Several projects at Berkeley Lab are examining electricity consumption of office equipment and ways to reduce it. In the course of examining photocopiers, BEA researcher Bruce Nordman also estimated the energy embodied in the paper, or the "paper power" consumed by copiers.

A typical mid-sized copier consumes about 1 kW of electricity while copying 50 pages per minute. Most efforts have focused on reducing this 1 kW and the standby losses (energy used when not copying). Nordman demonstrated that this approach overlooks a much larger consumption—the average 16 Wh required to manufacture each sheet of paper. This energy use is neglected because the energy is consumed at the paper mill, not the office.

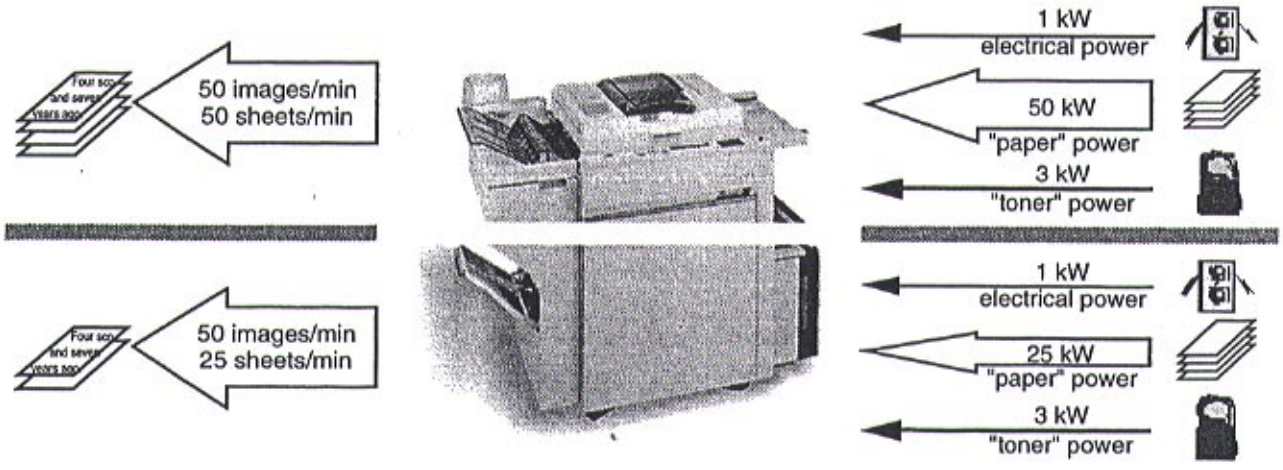
The typical U.S. office worker uses 5 sheets of paper per hour of work. This translates into 80 W of "paper power." However, paper costs about four times as much as the equivalent electricity that produced it, so 80 W of paper power costs as much as 320 W of electricity.

The cost of paper doesn't end when you buy it. The costs of copying, printing, faxing, mailing, and storing paper typically add up to over ten times the purchase price of paper. Thus the dollar cost of using paper is equal to buying over 3 kW of electricity for each office worker.

This suggests that far greater energy savings will be achieved by greater paper efficiency than through improvements in electricity use. Increased two-sided, or "duplex" copying, is one of many examples of paper efficiency.

Nordman has identified several strategies for reducing paper power and for reducing the overall cost of paper use. A current BEA project is addressing electricity and paper use in Energy Star copiers. For more information, please contact Bruce Nordman at (510) 486-7089 or send him e-mail at BNordman@LBL.gov.

—Bruce Nordman & Brian Pon



Most of the energy a copier consumes is not electricity but in the energy required to manufacture the paper. This "paper power" can be reduced by duplex copying.

Coming attractions: How much energy do industrial buildings consume? In some cases, it is surprisingly large and, in most cases, poorly understood.

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